REMARKS

Claims 1-16 and 20-25 are pending. Claims 1-16 and 20-25 stand rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the enablement requirement. Claims 1-16 and 20-25 stand rejected under 35 U.S.C. § 112, ¶ 2 as being indefinite for failing to particular point out and distinctly claim the subject matter that the Applicant regards as the invention. Claims 1-5, 7, 11-16, and 20-25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,363,378 to Conklin et al. Claims 6 and 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,363,378 to Conklin et al.

Reconsideration is requested. No new matter is added. The rejections are traversed. The specification is amended. Claims 1, 8, 10-12, 15-16, 20, 23 are amended. Claims 26-28 are added. Claims 1-16 and 20-28 remain in the case for consideration.

As a preliminary note, the Applicant notes that the Examiner has rejected a number of claims as being anticipated by or obvious over features of Conklin. But the claim features Conklin supposedly anticipates or makes obvious are not, in fact, in the claims in question. For example, the Examiner rejected claims 13 and 14 because Conklin supposedly teaches creating a state vector. But claims 13 and 14 make no mention of state vectors, nor are they dependent from claims that mention state vectors. The Applicant respectfully requests that the Examiner issue rejections that are based on the subject matter of the claims; it is difficult to respond to rejections that are unrelated to the subject of the claims.

INTERVIEW SUMMARY

On September 21, 2005, the undersigned spoke with Examiner Spooner regarding the rejection of the claims under 35 U.S.C. § 112, ¶¶ 1 and 2. The Examiner maintained that the feature in question was not taught in the specification. After much discussion, the undersigned proposed alternative language that encompassed the same intended meaning as the rejected language, but was clearly supported by the specification. Because the alternative language was substantially longer than the original language of the feature, the Examiner indicated he would discuss with his primary Examiner as to what claim language should be used.

The undersigned also requested to discuss the rejection of the claims over Conklin. The Examiner indicated a preference to include his primary Examiner in that discussion, and said he would call the undersigned back to schedule another interview that included his primary Examiner in early October.

On October 17, 2005, the undersigned spoke with Examiner Spooner and Examiner Storm. Several topics were discussed. The Examiners indicated that although the term "lineal ancestor" was not in the specification, the concept was supported by the drawings. Therefore, rather than amending the claims to remove the term, the Examiners suggested amending the specification to include the term, to overcome the rejection under 35 U.S.C. § 112, ¶¶ 1 and 2. The Examiners indicated that they did not think such an amendment would raise a new matter rejection. Such amendment is hereby submitted. The undersigned also noted that Examiner Edouard had previously indicated that overcoming the 35 U.S.C. § 112, ¶¶ 1 and 2 rejection would necessitate reconsideration of the rejections under 35 U.S.C. §§ 102(e) and 103(a) over Conklin.

Referring to the rejections under 35 U.S.C. § 102(e) over Conklin, the undersigned first argued that the claims describe directed sets, as opposed to trees in Conklin. Examiner Spooner pointed to column 12, line 37, where Conklin used the term "directed graph". The undersigned pointed out that Conklin still teaches multiple ontologies, each of which would be a separate directed graph. The Examiners responded by saying that the claims could be read as not limited to a single directed set. The undersigned argued that a single directed set was implicit in the claims, but the Examiners remained unconvinced.

The undersigned next argued that because Conklin teaches multiple ontologies, Conklin cannot teach the concept of a single maximal element. The Examiners responded by saying that the claims could be read to support multiple maximal elements. The undersigned argued that because chains extend from the maximal element to every concept in the directed set, there could be only one maximal element. The Examiners remained unconvinced, but agreed that amending the claims to recite "only one concept" instead of "one concept" would clarify this.

The Examiners then pointed out what they felt was an ambiguity in the claims, in that the claims do not required establishing more than one directed link, but the chains from the maximal element to each concept use the directed links, which was unclear. The undersigned asked if the Examiners had any suggestion as to how to clarify this, to avoid a further 35 U.S.C. § 112, ¶ 2 rejection, but the Examiners had no suggestions. (The undersigned would like to point out that as the Examiners believe this ambiguity exists now, then any amendment made in this response to the Office Action dated June 21, 2005 would not necessitate the new grounds for rejection. Therefore, if the Examiners reject the claims under 35 U.S.C. § 112, ¶ 2 for this reason in the next Office Action, the Applicant believes the next Office Action should not be made final.)

The undersigned next pointed out that Conklin does not use the term "chains" or any analogous term, and that with multiple ontologies there cannot be a chain from a maximal element (as with multiple ontologies there is no maximal element). The undersigned also pointed out that Conklin does not teach bases or measuring how concretely concepts are represented in the basis chains (which compares a concept with a set of concepts). The undersigned also commented that he had not yet received an explanation as to why the Examiner considered weighting analogous to basis chains. The Examiner indicated he would provide a written explanation, and would consider the Applicant's arguments regarding bases and measurement as claimed.

Because of the length of the telephone interview, the undersigned pointed to the features described in the dependent claims that the Applicant believes are distinguishable over Conklin, but did not discuss those features in detail.

REJECTIONS UNDER 35 U.S.C. § 102(e)

Claim 1 is directed toward a method for building a directed set to allow a user of a computer system to find a context in which to answer a question, the method comprising: identifying a plurality of concepts to form a directed set, wherein only one concept is a maximal element; establishing directed links between pairs of concepts in the directed set, the directed links defining "is a" relationships between the concepts in the pairs of concepts, so that each concept is either a source or a sink of at least one directed link; establishing chains in the directed set from the maximal element to each concept, where for each pair of concepts in each chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts; selecting one or more chains in the directed set as a basis; and measuring how concretely each concept is represented in each chain in the basis.

Claim 11 is directed toward a computer-readable medium containing a program to build a directed set to allow a user of a computer system to find a context in which to answer a question, the program comprising: identification software to identify a plurality of concepts to form a directed set, wherein only one concept is a maximal element; chain-establishment software to establish chains in the directed set from the maximal element to each concept, where for each pair of concepts in each chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts; chain-selection software to select one or more chains in the directed set as a basis; and measurement software to measure how concretely each concept is represented in each chain in the basis.

Claim 12 is directed toward storage medium for storing a lexicon as a directed set for use by an application program to establish a context for a query, the storage medium comprising: a data structure stored in the storage medium, the data structure including the lexicon and including: a plurality of concepts stored in the storage medium, wherein only one concept is a maximal element; and at least one chain extending from the maximal element to each concept, wherein the chain includes an ordered subset of the concepts, beginning with the maximal element and ending with the concept, where for each pair of concepts in each chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts.

Claim 15 is directed toward an apparatus on a computer system to build a directed set to allow a user of the computer system to find a context in which to answer a question, the apparatus comprising: a data structure according to claim 12 to store the directed set; an identification unit to identify the plurality of concepts in the directed set, wherein the directed set includes only one maximal element; a chain unit to establish chains in the directed set from the maximal element to each concept, where for each pair of concepts in each chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts; a basis unit to select one or more chains in the directed set as a basis; and a measurement unit to measure how concretely each concept is represented in each chain in the basis.

Claim 16 is directed toward an apparatus on a computer system to build a directed set to allow a user of the computer system to determine what questions can be answered using a given context, the apparatus comprising: a data structure according to claim 12 to store the directed set; an identification unit to identify the plurality of concepts in the directed set, wherein the directed set includes only one maximal element; a chain unit to establish chains in the directed set from the maximal element to each concept, where for each pair of concepts in each chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts; a basis unit to select one or more chains in the directed set as a basis; and a measurement unit to measure how concretely each concept is represented in each chain in the basis.

Claim 20 is directed toward an apparatus on a computer system to enable a user of the computer system to find a context in which to answer a question, the apparatus comprising: a directed set stored in the computer system, the directed set including a plurality of first concepts, only one maximal element, and at least one basis chain extending from the maximal element to one of the first concepts, where for each pair of first concepts in each basis chain, one of the pair of first concepts is a lineal ancestor of the other of the pair of first concepts; an input for receiving a content stream; a listening mechanism listening to the content stream

and parsing the content stream into second concepts; and a measurement mechanism measuring distances between pairs of the second concepts according to the plurality of first concepts and the basis chains of the directed set.

In contrast, Conklin teaches an information retrieval system. Nodes, depicting terminological concepts, are arranged into trees. A query is analyzed to determine query feedback terms, and corresponding terminological concepts are selected as query feedback nodes. Focal nodes are selected based on the topics, and a conceptual proximity is measured between the focal nodes and query feedback nodes. The query feedback nodes are then ranked based on conceptual proximity to the focal nodes.

Conklin fails to teach at least three features of the claims: chains, selecting a basis, and measuring how concretely a concept is represented in a chain. Why Conklin fails to teach these features is discussed below.

Conklin does not teach or suggest chains as claimed

Conklin might be said to teach the establishing of chains, in that there is a path between any two nodes in a tree. But Conklin makes no mention of any significance to chains, and does not even use the term. And for this to be true, there is the additional assumption that there could only be one ontology in Conklin, as with multiple ontologies, there cannot be a single maximal element as claimed.

In addition, such an interpretation of the meaning of the term "chain" ignores certain basic facts about chains as claimed. Chains are sets of concepts, connected by directed links, and start at the maximal element. That means that the concepts in chains move from the general to the specific, narrowing the focus of the interpretation. This is explicitly stated in the claims, where the directed links define "is a" relationships between pairs of concepts. Conklin does not teach or suggest this. And to analogize a chain to a path between nodes in a tree ignores stated features of the claims. Thus, Conklin does not teach or suggest chains.

Conklin does not teach or suggest selecting chains to form a basis

Even if Conklin could be said to teach establishing chains, Conklin teaches nothing about selecting chains to form a basis. In mathematics, a basis is a set of vectors or other objects that span a subspace. While it might not appear that the chains that make up the basis span a subspace, in fact they do. Conklin has no analog to the concept of selecting chains to form a basis.

In addition, the concept of a "basis", aside from being discussed in the specification at page 8, lines 12-19, is a well-defined concept. (*See, e.g.*, STEWART VENIT & WAYNE BISHOP, ELEMENTARY LINEAR ALGEBRA 146 (2d ed. 1985), a copy of which is attached.) Had Conklin intended to teach forming a basis for a subspace, he would have used the term. That he did not use the term "basis" anywhere in his patent makes clear that he does not view his "chains" (undefined as they are) as forming a subspace.

The Examiner points to figure 4 and column 7, line 62 through column 9, line 26 of Conklin as teaching selecting chains to form a basis. It is unclear to what the Examiner is referring. The Applicant can only infer that the Examiner is reading Conklin's weighting approach as forming a basis. But this reading of Conklin fails for two reasons. First, selecting chains for the basis has nothing to do with measuring the distance between the basis chains and concepts in the directed set, to which weighting would be applicable. Second, Conklin's weighting approach is highly dependent on the terms being searched in the trees, whereas the basis chains in the instant invention are selected without regard to any particular terms that might be searched. The Examiner has not indicated why this argument is incorrect. Thus, assigning weights to individual nodes in the Conklin ontologies cannot be considered to teach selecting chains to form a basis.

Conklin does not teach or suggest measuring how concretely a concept is represented in a basis chain

Finally, the instant invention teaches measuring how closely each concept is represented in the basis chains. As discussed above, a chain is a set of concepts connected by directed links and originating at the maximal element, thus moving from the general to the specific. Thus, measuring how concretely a concept is represented in a basis chain involves measuring a distance between a node in the directed set and a set of concepts (i.e., more than one concept), and is not simply measuring a distance between two nodes. Conklin teaches measuring the distance between two specific nodes: a focal node and a query feedback node. As the objects being compared are quite different in the instant invention as compared with Conklin, Conklin cannot be said to teach or suggest the measurement taught in the instant invention.

Independent claims 1, 11, 15, 16, and 20 all describe these three features. Independent claim 12 describes chains, and claim 14, dependent from claim 12, adds the basis concept. Therefore, claims 1, 11-12, 14-16, and 20 should be patentable under 35

U.S.C. § 102(e) over Conklin. Accordingly, claims 1, 11-12, 14-16, and 20, and dependent claims 2-10, 13, and 21-28, should be allowable.

Conklin does not teach or suggest state vectors, or how to measure a distance between them

Claim 2 is directed toward a method according to claim 1 further comprising creating a state vector for each concept in the directed set, wherein each state vector includes as its components measures of how concretely the concept is represented in each chain in the basis.

Claim 3 is directed toward a method according to claim 2 wherein creating a state vector for each concept in the directed set includes measuring a distance between the state vectors for each pair of concepts.

Claim 22 is directed toward an apparatus according to claim 20, wherein the measurement mechanism includes: a state vector constructor converting each second concept into a state vector in Euclidean k-space; and measuring means for measuring the distance between state vectors corresponding to the second concepts according to the plurality of first concepts and the basis chains of the directed set.

In rejecting claims 2 and 3, the Examiner cited to the document theme vector of Conklin. As shown in Table 1 in column 4 of Conklin, the document theme vector includes document themes, their relative strengths, and potentially categories for the themes. The Examiner did not cite anything in Conklin discussing measuring distances between vectors.

It is worth noting that Conklin teaches only one theme vector per document. This makes sense, as each document theme vector for a single document would be the same.

The invention claimed in claims 2 and 22, however, is not a document theme vector. It is a state vector for concepts, which are independent of documents. It is worth noting that none of the claims uses the term "document". But claim 2 does mention "a state vector for each concept"; claim 22 is similar. Thus, the state vectors are not document theme vectors, but rather representations of the concepts in a Euclidean space (this is mentioned explicitly in claim 22). Thus, the only similarity between the state vectors of claims 2 and 22 and Conklin's document theme vector is the use of the word "vector"; otherwise, the elements are completely different.

The Applicant also notes that the Examiner rejected claim 3 for the same reasons as claim 2, and rejected claim 22 for the same reasons as claims 1, 11-12, and 15. The Applicant guesses that the similarity noted by the Examiner was in the measurement of distance. But measuring the distance between vectors in a Euclidean space is very different

from measuring the distance between nodes in a tree, and one does not teach or suggest the other. For example, page 10, lines 8-20 of the specification provides three different formulae that can be used to calculate the distance between two vectors: the Euclidean distance shown in Equation (1a), the "city block" distance shown in Equation (1b), and the other distance metric shown in Equation (1c). This point is emphasized in new claims 26-27, which claim measuring Euclidean distance between state vectors. Claims 3 and 22 are more general, and can support other distance metrics applicable in Euclidean vector spaces.

As claims 2-3 and 22 describe features not taught or suggested by Conklin, claims 2-3 and 22 should be patentable under 35 U.S.C. § 102(e) over Conklin. Accordingly, claims 2-3 and 22, and dependent claims 26-27, should be allowable.

Conklin does not teach or suggest updating the directed set

Claim 7 is directed toward a method according to claim 1 further comprising: receiving new information about a first concept in the directed set; and updating the directed links for the first concept.

In rejecting claim 7, the Examiner cited to column 10, line 23 to column 12, line 44 of Conklin. Neither that portion nor any other part of Conklin teaches the structure of a knowledge base, but does not teach how the knowledge base is constructed in the first place. Similarly, neither that portion nor any other part of Conklin teaches taking an existing knowledge base and modifying it. Since such modification is exactly what claim 7 is directed toward, Conklin fails to teach or suggest the features of claim 7. Therefore, claim 7 is patentable under 35 U.S.C. § 102(e) over Conklin, and accordingly is allowable.

REJECTIONS UNDER 35 U.S.C. § 103(a)

Conklin does not teach or suggest changing basis

Claim 6 is directed toward a method according to claim 1 further comprising: discarding the chains in the basis; and re-selecting one or more chains in the directed set as a new basis.

In rejecting claim 6, the Examiner opined that Conklin's teaching of selecting nodes based on the weight of the node would make obvious changing the basis. The Applicant traverses the Examiner's reasoning. While weighting might provide a reason for Conklin to select one node over another, that has nothing to do with selecting chains for inclusion in a basis.

It is worth noting that Conklin's selecting of focal categories – nodes – using the weighting is entirely dependent on the document in question. But claim 6, like base claim 1, does not mention the use of a document. The changing of the basis can be accomplished entirely independently of any document. This point is emphasized in new claim 28, which makes this independence explicit. Thus, Conklin's teaching, which depends entirely on the document in question, cannot make obvious changing a basis in a manner that is independent of any document.

Because Conklin does not teach or suggest changing a basis, claim 6 is patentable under 35 U.S.C. § 103(a) over Conklin. Accordingly, claim 6, and dependent claim 28, is allowable.

Conklin does not teach or suggest updating the directed set

Claim 8 is directed toward a method according to claim 7 wherein updating the directed links includes at least one of:

a) removing an existing chain from the maximal element to the first concept; and

b) establishing a new chain from the maximal element to the first concept, where for each pair of concepts in the new chain, one of the pair of concepts is a lineal ancestor of the other of the pair of concepts.

Claim 8 further refines the subject matter of claim 7. As argued above, Conklin does not teach how to modify the knowledge base; Conklin therefore cannot teach or suggest the method of removing chains and establishing new chains. (This argument does not even touch on the fact that Conklin does not teach or suggest chains as claimed.) Therefore, claim 8 is patentable under 35 U.S.C. § 103(a) over Conklin, and claim 8 is therefore allowable.

Conklin does not teach or suggest listening to a content stream

Claim 9 is directed toward a method according to claim 1 wherein identifying a plurality of concepts includes: listening to a content stream; and parsing the concepts from the content stream.

Claim 10 is directed toward a method according to claim 1 wherein establishing chains in the directed set from the maximal element to each concept includes: listening to a content stream; identifying a relationship between a first concept and a second concept from the content stream; and establishing a chain from the maximal element to the first concept through the second concept to model the relationship between the first and second concepts.

Claims 9 and 10 (and also independent claim 20) include the concept of listening to a content stream. (The Applicant notes that in the rejection of claim 20, the Examiner indicated claim 20 was of the same scope and content as claims 1, 11-12, and 15, and therefore was rejected under the same rationale, without making any comment about the mention of the content stream in claim 20.) Nowhere does Conklin mention listening to a content stream, or identifying concepts from the content stream. The closest Conklin comes is identifying document themes from a document, but the two ideas are hardly the same. (In addition, the Examiner's reason for rejecting claims 9-10 discussed how Conklin supposedly taught updating the basis, and did not touch on the concept of a content stream.) As Conklin does not teach or suggest listening to a content stream, claims 9-10 are patentable under 35 U.S.C. § 103(a) over Conklin, and therefore are allowable.

For the foregoing reasons, reconsideration and allowance of claims 1-16 and 20-28 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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Attachment A
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independent *and* span the subspace are of particular importance in linear algebra. In this section we investigate the characteristics of such sets.

BASIS FOR A SUBSPACE

DEFINITION

Let $\mathbf{S}$ be a subspace of $\mathbf{R}^m$. A set $\mathcal{J}$ of vectors in $\mathbf{S}$ is a **basis** for $\mathbf{S}$ if

i. $\mathcal{J}$ is linearly independent and

ii. $\mathcal{J}$ spans $\mathbf{S}$.

EXAMPLE 4.16

Show that the set of elementary vectors in $\mathbf{R}^m$, $\mathcal{J} = \{\mathbf{e}_1, \mathbf{e}_2, \ldots, \mathbf{e}_m\}$, is a basis for $\mathbf{R}^m$.

By Exercise 29 of Section 4.1, $\mathcal{J}$ is linearly independent. Moreover $\mathcal{J}$ spans $\mathbf{R}^m$ (Example 4.13). Hence $\mathcal{J}$ is a basis for $\mathbf{R}^m$.

NOTE: The basis, $\{\mathbf{e}_1, \mathbf{e}_2, \ldots, \mathbf{e}_m\}$ is called the **standard basis** for $\mathbf{R}^m$.

EXAMPLE 4.17

Show that the set $\mathcal{J} = \{(1, 0, 0), (1, 2, 0), (1, 2, 3)\}$ is a basis for $\mathbf{R}^3$.

We can show that $\mathcal{J}$ is linearly independent and that $\mathcal{J}$ spans $\mathbf{R}^3$ at the same time. Let $\mathbf{w} = (w_1, w_2, w_3)$ be an arbitrary vector in $\mathbf{R}^3$. Then $\mathcal{J}$ spans $\mathbf{R}^3$ if there exist scalars c_1, c_2, c_3 such that

$$c_1(1, 0, 0) + c_2(1, 2, 0) + c_3(1, 2, 3) = (w_1, w_2, w_3).$$

Performing the scalar multiplications and equating corresponding components yields the linear system

$$\begin{aligned} c_1 + c_2 + c_3 &= w_1 \\ 2c_2 + 2c_3 &= w_2 \\ 3c_3 &= w_3, \end{aligned}$$

which has the coefficient matrix

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 2 \\ 0 & 0 & 3 \end{bmatrix}.$$

By Theorem 5 of Section 2.5 there is a unique solution to this system if the row-reduced echelon form of A is the identity matrix I. Performing the row-reduction we see that this is indeed the case, so $\mathcal{J}$ spans $\mathbf{R}^3$. Moreover, in doing the row-reduction and obtaining the identity matrix, we have also shown that $\mathcal{J}$ is linearly independent (Theorem 4 of Section 4.1). Consequently $\mathcal{J}$ is a basis for $\mathbf{R}^3$.

Now suppose that we wish to find a basis for the subspace $\mathbf{S}$ generated by a set, $\mathcal{J}$, of vectors in $\mathbf{S}$. By definition $\mathcal{J}$ spans $\mathbf{S}$, but $\mathcal{J}$ is not necessarily linearly independent. The following theorem and accompanying procedure show us how to *reduce a spanning set to a basis.*

Attachment A
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